Space Weather Forecast

Issued on Sunday, 02 July 2023 at 13:20 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Occasional Minor/Moderate R1/R2 Radio Blackouts likely. Slight chance of Minor Geomagnetic Storm intervals 04 Jul.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity is Moderate with two Moderate-class flares observed during the period, the peak an M2.0 event at 02/0235 UTC from a developing region in the southeast quadrant. A sunspot in the northwest remains the largest and most magnetically complex sunspot group on the visible side of the Sun and has the greatest potential for notable flares. Overall there are eight sunspot regions on the Earth-facing side of the Sun, however, most are considerably smaller and more magnetically simple than the sunspot in the northwest.

Two Moderate flares from a sunspot region in the far southeast appear to have resulted in separate, slow Coronal Mass Ejections (CMEs). These are still to be fully assessed for any Earth-directed component, but it is likely they will pass behind Earth.

Solar Wind / Geomagnetic Activity: The solar wind indicates a weak connection to a coronal hole feature in the far southwest quadrant. The solar wind speed was initially between Elevated and Slightly Elevated levels around 480-510km/s, with a slow and erratic decline to 430-450km/s by the end of the period. The associated magnetic field was weak throughout, while the important north-south component also varied weakly, and was mainly northward in orientation. Geomagnetic activity was Quiet (Kp1-2).

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Low to Moderate activity is expected, with occasional Moderate flares likely and a slight chance of isolated Strong flares. The risk mostly coming from the large sunspot in the northwest, but potentially also the emerging sunspots in the southeast or any returning regions through the forecast period.

Solar Wind / Geomagnetic Activity: A CME associated with the Moderate class flare on the 29 Jun may affect Earth as a glancing blow on day 3 (04 Jul). In the absence of any CME activity, the currently slightly elevated fast wind resulting from the connection to a coronal hole high-speed stream in the far southwest should slowly decline. A connection to a small coronal hole in the southwest may occur on day 3 (04 Jul), however any enhancements from this feature are expected to be weak, though may combine with the 29 Jun CME arrival at Earth.

Predominantly Quiet (Kp 0-2) geomagnetic activity should continue in the coming days, with only a slight chance of Active or G1/Minor Storm conditions on day 3 (04 Jul) from one or a combination of minor high-speed stream and CME effects.

Energetic Particles / Solar Radiation: Solar radiation storms are not expected in the period and levels of protons are most likely to remain at Background levels. There remains a daily slight chance of reaching the Minor Storm level, mainly due to the large sunspot in the northwest.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	1	20	5
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	75	75	75	40
Very Active	R3 to R5 X	No	10	10	10	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	10	10	10
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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